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PERSPECTIVES IN PSYCHOLOGY
X. PERCEPTION AND THE PSYCHOLOGICAL METASYSTEM

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Metaphysical dualism is an enduring philosophical doctrine and still a viable postulational basis for the sciences. There is, however, a widespread belief in psychology that dualism has been superseded and can conveniently be forgotten. That there is some basis for the view that dualism is a dead issue cannot well be denied. One has only to examine much of the current work in learning, motivation, and social psychology to be convinced that psychology can make progress without reference to a Cartesian mind. At the same time the psychologist should be aware of the fact that the doctrine of direct, private experience is still held as a protopostulate by many physical scientists and psychologists.

IMMEDIATE EXPERIENCE AND PERCEPTUAL THEORY

Wundt believed that psychology is the science of immediate experience known directly through introspection. The other sciences, according to Wundt, deal with mediate experience, or constructed objects derived from immediate experience. While psychological processes parallel bodily states, they are known independently and do not reduce to brain states. Even though physiological advances may increase our understanding of the correlates of mental states, they cannot be expected to unravel the mysterious relationship of the physical to the psychical. Acceptance of this general philosophy led Eddington (1928, p. 283) to assert that "the only subject presented to me for study is the content of my consciousness." Reasoning from this kind of postulate led Jeans (1930, p. 158) to the idealistic conclusion that, "The universe begins to look more like a great thought than a great machine." The operationism of Bridgman (1936) and Margenau (1950) also reflects underlying acceptance of the doctrine that science begins with immediate experience.

In psychology the topics of sensation and perception provide the last great stronghold of dualistic thinking. According to a widely accepted view the term perception refers to a non-physiological outcome of physiological processes. The physiological conditions or correlates of per-

ception are regarded as occurring in the sensory areas of the cerebral cortex. This dualistic theory gives us brain states on the one hand and intangible, immaterial awareness on the other.

Two approaches to perceptual problems are current among those who accept an experiential postulate. The phenomenologists take consciousness as it comes and are reasonably content with its full description. The operational behaviorists, on the other hand, work to achieve a monistic system through the application of operational principles. Having observed that a mental state can be defined by the operations used to measure it, they have concluded that physical data can be substituted for conscious data. Psychology is brought within the unity of the sciences by becoming, in Wundt's sense, another science of mediate experience. As Boring (1950, p. 659) put it, "the behaviorist can eat the cake of consciousness and have it too."

Neither Boring's operational reduction nor his identity theory of the mind-body relation can remove the underlying dualism. This dualism stems from the postulation of immediate experience as the private, qualitative ground of all scientific endeavor. A similar position is taken by Tolman (1958, p. 94) who states that "psychology does not seek descriptions and intercommunications concerning immediate experience *per se*." Spence (1948, p. 68) regards immediate experience as "the initial matrix out of which all sciences develop" but it "is no longer considered a matter of concern for the scientist qua scientist." Stephenson (1953) has pointed out that psychologists who take this position seem to assert that experience and behavior are fundamentally different. *Thus the operational behaviorist appears to deny at the outset the unity he struggles to establish.*

The phenomenologist has the advantage of being able to deal with experience as it comes in all of its full richness, a task which Tolman would leave to the man in the street, the poet, and the philosopher. Since phenomenological psychologists are deeply concerned with meanings, qualities, and the rich matrix of experience, their work often appeals to the interested layman much more than the more precise yet labored and restricted efforts of the operational behaviorists. No human problem need fall outside the scope of a phenomenological psychology which may be broad enough and catholic enough to encompass all interests.

In spite of the breadth and scope of phenomenological systems they are limited in a peculiar way. When, as in the case of topological psychology, an attempt is made to erect a consistent phenomenological system, it becomes necessary to exclude physical constructs. The result is that one becomes wedded to an inner frame of reference, and it is then extremely diffcult to coordinate findings with those of physics and biology. As Lewin found, moreover, there is a tendency for physical variables to creep into the system thus destroying its self-

contained character. Lewin could have resorted to a brain model to establish the connection between the phenomenological and physical worlds but he chose not to do so. The dualism of the two worlds was squarely faced but never resolved.

The Gestalt psychologists have attempted to avoid the encapsulation of a purely phenomenological system by erecting a bridge which will permit them to transcend phenomenology. This they have done through the postulation of an isomorphic relationship between the phenomenological field (psychical) and the brain field (physical). In spite of certain differences the Gestalt position is similar to that of the psychophysical parallelists. In both cases we are left with *two worlds which can only be correlated, not united,* through the postulation of brain powers as the intimate conditions of consciousness.

SOME DILEMMAS OF DUALISTIC PSYCHOLOGY

The deficiencies of a dualistic system are well known and psychologists have worked strenuously to avoid them. First, there is the apparent impossibility of bringing the mind language and the physical language into a common functional organization. The implications of immateriality in the mind language pose the problem of the relationship between the immaterial mind and the material body (Bentley, 1935). The difficulties here are so serious that many scientists have been led to postulate an uncrossable gap between mind and body.

Next there is the problem of subject-object which is distinct from that of body-mind. Is the "external" object created by the subjective awareness of the observer? Can the mind language embrace the externality of objects, or conversely, can a physical language adequately embrace mental events? The mind language seems to have its own implications and its own sphere of applicability for which the language of external objects (physical things) seems quite inadequate (Bentley, 1935).

Even more serious is the way in which the mind language isolates psychological activities from the rest of nature. Each mind has a specific locus and is clearly distinct from all other minds as well as from physical objects. When perception is regarded as an event which is post-afferent and pre-efferent all human knowledge is squeezed into a mysterious process held to occur in a region somewhere between sensory and motor nerve conduction. Bentley (1935) has referred to this characteristic of the mind language as isolationality and Kantor (1941) has shown that the view leads to the postulation of internal principles either in the form of mental faculties or brain powers. In practice it is impossible to hold psychology within such a limited theoretical frame of reference and it becomes almost preposterous to think of the reduction of psychology to the neurophysiology of a small portion of the central nervous system.

HISTORICAL SUPPORTS OF SUBJECTIVISM

In spite of its defects the postulate of immediate experience persists. Of course the weight of our philosophical tradition lies behind the doctrine, but philosophy alone cannot account for such persistence in the face of serious difficulties. It is likely that the experiential doctrine survives because of the widespread belief that experimental facts have established the casual theory of perception beyond any doubt and because of the related conviction that there is no satisfactory alternative to the doctrine of specific nerve energies.

According to the causal theory of perception a continuous chain of causation, starting with the external object, leads to the sense organ of the percipient, thence over the sensory nerve to the appropriate sensory area in the cortex. Up to this point everything in the chain is either physical or physiological. But at this point, and prior to the passage of the impulse into the efferent nerve fiber, there occurs a non-physical sensation. Thus an immaterial factor is introduced or superimposed upon a closed physical system.

The doctrine of specific nerve energies holds in essence that we are not aware of external objects but rather of the conditions of our sensory nerve endings. Red, for example, is a sensation aroused by the stimulation of a specific type of cortical nerve fiber regardless of the manner by which the fiber was stimulated. Sensory qualities are not regarded as actual object qualities but only as signs of them in the mind. The doctrine of specific nerve energies supplements the causal theory of perception and is entirely consistent with it. Interestingly enough, the doctrine is widely accepted even though the theory has changed very little since Helmholtz's extension of the original statement by Müller. Although several recent writers regard the theory as merely a reasonable working hypothesis, implicit acceptance of the doctrine is widespread.

BEHAVIORAL POSTULATION IN PERCEPTUAL THEORY

Changes in the psychological metasystem are required if we are to avoid problems inherent in a dualistic system. An important proto-postulate of an adequate metasystem, to be set over against the experiential postulate, is that psychology is concerned with behavior and nothing else. Immediate experience, whether regarded as the subject matter of psychology or as the initial matrix from which scientific data are derived, is completely set aside. Private experience, sensations in the mind, phenomenal objects, secondary qualities and similar constructs can be banished for once and for all. Such a step can readily be taken but only if one is prepared to accept the independent existence of objects and their qualities. Confusion results when objects

are equated with objects as reacted to, and object qualities are identified with qualities as perceived (Kantor, 1941).

Psychological events may be regarded as the outcome of a long evolution of inorganic substances and living organisms (Kantor, 1958). In the course of this evolution living organisms have developed capacities for interacting with environmental objects. *Perceptual behavior in human beings is continuous with the elementary discrimination reactions of such primitive organisms as the amoeba and the paramecium.*

The postulation of behavior as response to objects in an objective environment has been regarded as the adoption of a metaphysical position, namely realism. Postulates of a psychological metasystem need not, however, be regarded as metaphysical. They are perhaps better described as stipulative rules provisionally adopted and subject to correction and reformulation in the light of results attendant upon their use.

Although Russell (1948) has been unable to abandon the traditional approach to psychology he has recently come to conclusions which seem to imply a more objective position, one similar to that outlined above.

> "Ever since Kant, or perhaps it would be more just to say ever since Berkeley, there has been what I regard as a mistaken tendency among philosophers to allow the description of the world to be influenced unduly by considerations derived from the nature of human knowledge. To scientific common sense (which I accept) it is plain that only an infinitesimal part of the universe is known, that there were countless ages during which there was no knowledge, and that there probably will be countless ages without knowledge in the future. Cosmically and causally knowledge is an unimportant feature of the universe; a science which omitted its occurrence might, from an impersonal point of view, suffer only from a trivial imperfection. In describing the world, subjectivity is a vice. Kant spoke of himself as having effected a 'Copernican revolution' but he would have been more accurate if he had spoken of a 'Ptolemaic counter-revolution,' since he put Man back at the center from which Copernicus had dethroned him" (p. xi).

We need only add that knowledge itself is derived from contact with things and does not imply any non-natural happening.

BEHAVIORAL APPROACHES TO PERCEPTION

In no sense can it be said that the improvement of one's postulates can solve scientific questions. Such problems require the careful in-

terpretation of empirical evidence, and postulation can provide at best only a basic orientation or point of view. Even with inadequate postulates, scientists can achieve significant results when factual considertions dominate inquiry. Certainly much of the older work in perception has value today and can readily be incorporated into a behavioral framework. The extension of the behavioral framework to such topics as perception, thought, and memory has been taking place gradually. Some investigators have broken sharply with traditional mentalistic views while others have retained vestiges of established modes of thought. In any case the trend of empirical studies is clear. The investigational base has been broadened, and interpretations are being made in terms which are coordinate with those employed in areas already more firmly established on a behavioral base. In his recent survey of perception Bartley (1958) has been able to present a highly factual account, yet at the same time he has provided a consistent behavioral framework and has avoided the postulation of mental faculties or their physiological counterparts. In recent years a great many studies have been conducted in the areas of social perception, space perception, and the perceptual constancies. Many of these are especially well adapted to interpretation within a behavioral field framework.

One of the first attempts to establish a behavorial theory of perception was that of Kantor (1924). He took the position that perceptual activities are responses of the organism as a whole and that they evolve on the basis of contacts between organism and object. As a result of such contacts meanings are elaborated which serve to adapt the individual to his surroundings. The perceptual constancies provide numerous examples of such meanings. Perception has a partially implicit character in the sense that it involves a response to attributes of the stimulus not explicitly confronting the individual. One may, for example, perceive the "sourness" of a lemon when stimulated visually (implicit response) or gustatorily (explicit response). The preparatory nature of perceiving responses was also stressed in Kantor's description. Kantor succeeded remarkably well in describing perception in behavioral terms and in staking out the territory which an adequate theory of perception should cover.

Dewey and Bentley (1949) have developed an approach somewhat similar to that of Kantor which they have termed transactional. The transactional position has been employed by the Ames-Cantril group to interpret their interesting and significant perceptual demonstrations (Kilpatrick, 1952). They regard past experience as important in the building up of an assumptive world. Perception operates in accordance with the assumptive world and serves as a guide to activity. Our assumptions function as probabilities and are built up, checked, and modified by action.

The probabilistic functionalism of Brunswik (1952), like the approaches of Kantor, and Dewey and Bentley, avoids the isolationality

of the mind language. Brunswik (1952, p. 72) has concerned himself with "distal-to-distal functional arcs bridging over the entire organism without descending into it." Interest is shown in the relationships established by the organism with objects, rather than concern with the role of the organism in a physiological sense. In developing a psychology concerned with objects Brunswik has focused his attention upon constancy phenomena. Here the distal relationships are particularly important. Using the data available to it, the organism reconstitutes the object as best it can. The resulting approximation or probability usually suffices to meet the needs of the organism. Although Brunswik's experimental work was confined to a restricted area, he employed principles having possibly great generality within a framework broad enough to encompass perceptual facts without undue distortion.

CONCLUSION

It is too early to say with any certainty that experiential and phenomenological views are on the way out. In spite of the problems surrounding this type of postulation, the approach is reinforced by the approving reactions of theologians, philosophers, humanists, and probably the majority of scientists. The two worlds view is deeply entrenched in our culture and probably will not soon be supplanted. Tradition, which is the only obstacle to the abandonment of dualism in psychology, can be readily set aside once psychologists perceive the complete irrelevance of consciousness for a science of behavior (Stephenson, 1953).

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COMMENTS ON TWO RECENT METHODS FOR ANALYZING THE PSYCHOTHERAPEUTIC PROCESS[1]

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In recent years researchers have paid increasing attention to the quantitative analysis of the therapeutic process. Partly, at least, this effort reflects the realization that investigations which deal with the outcomes of therapy are of limited utility unless they provide more complete information on the *process*. All too often the independent variable to which therapeutic results are attributed is merely described as "psychotherapy," "analytically-oriented psychotherapy," "client-centered therapy," etc. Such global descriptions, it is by now suspected hide more than they disclose. This feeling seems to be particularly prevalent among investigators showing a genuine concern with the understanding and elucidation of therapeutic phenomena. These investigators, too, seem to be less impelled by a need to demonstrate the "efficacy" of a particular therapeutic method. The recently proposed systems by Rogers, and Leary and Gill are outstanding examples of attempts to penetrate the complexities of the therapeutic interchange. The purpose of this paper is to give a brief description of these systems—enough to establish a context—and to contribute a few comments.[2]

Certainly, the approaches of Rogers and of Leary and Gill are diametrically opposed, and the two conceptions reflect the temperaments and personalities of their originators as clearly as any form of human expression. However, they have one important characteristic in common: they are both significant attempts to bring objectivity to bear on the same complex, intricate, and elusive process which has such great fascination for all of us.

Rogers[3] believes that progress has been made in measuring and and conceptualizing outcomes of therapy in terms of theory but in

[1] Read at symposium "Report on the Washington Conference on Research in Psychotherapy," annual meeting of the American Psychological Association, Washington, D. C., 1958.

[2] Following the conference on research in psychotherapy, held in Washington, D. C., on April 9-12, 1958, Professor William U. Snyder invited several participants to take part in a symposium designed to acquaint the membership of the American Psychological Association with the proceedings of the conference. Each panelist was asked to review and comment on a segment of the conference. This paper represents the author's contribution to the symposium. The proceedings of the conference, including the papers reviewed here, have recently been published in Eli A. Rubinstein and Morris B. Parloff (Eds.), *Research in Psychotherapy*. Washington, D. C.: Amer. Psychol. Ass., 1959

[3] Rogers, C. R. "A Tentative Scale for the Measurement of Process in Psychotherapy."

regard to the *process* of psychotherapy no satisfactory conceptions or theories have been formulated. To remedy this deficiency he became a naturalistic observer. As he listened patiently and over extended periods of time to recordings of therapeutic interviews he became impressed with "a rather fundamental continuum" which to him seemed to represent the flow of therapeutic processes. He then proceeded to construct a tentative scale along which personality change in the broad sense could be measured. This scale ranges from "rigidity and fixity of psychological functioning on the one hand, to psychological flow and changingness on the other." Seven discriminable stages along this continuum are described (Rogers, 1958). This flow is said to manifest itself in the "standard psychological climate of the therapy situation" in which the client feels himself to be "empathically understood, accepted, and received *as he is.*"

Rogers conceives of the hypothesized continuum as a stream originating in a number of separate sources which, at the beginning of therapy, are completely "frozen." Here, feelings are unrecognized, unexpressed, unowned. As therapy proceeds, as feelings previously denied to awareness break through, there is a new form of "experiencing," characterized by directness, immediacy, and spontaneity. The process is characterized by several other elements which are probably highly intercorrelated.

To what uses has this continuum been put? In a pilot study, a group of judges was asked to rate on the process scale the position of some major theme discussed by a patient throughout therapy. Agreement was fair; there also was a positive, but not significant relationship, between the level of a statement and the time of its occurrence in therapy. Rogers tentatively concluded that he is dealing with a real continuum and that client statements can be reliably rated on this scale.

He also envisages the possibility that a brief sample of an individual's expressive behavior may give a reliable and valid clue of where he stands on the continuum of psychotherapy or, even more generally, of personality; and further, that this assessment can be made without knowledge of the person's social and personal background, without knowledge of personality type, etiology, or diagnosis.

Finally, from the vantage point of his maturity and experience Rogers makes a prediction which seems extremely noteworthy. He believes that the phenomenological, existential trend is in the ascendency in American psychology and presages that an increasing concern with subjectivity and "the human encounter with life" will lead to new phases of discovery and progress. This prediction suggests several observations.

First, there is some question about the number of American psychologists who would share Rogers' forecast, which is a bold one indeed.

Despite its undeniable appeal to the clinician, the phenomenological-existentialist position continues to be viewed with distrust in this country. While the point of view seems to gain momentum in Europe, only time will tell whether it will ever eclipse the logical positivist tradition to which modern science, including psychology, owes so much.

An investigator is free to choose his frame of reference and to define his concepts. For many purposes it is exceedingly fruitful to accept the patient's frame of reference as the focus of one's observations. Rogers' own work certainly bears tribute to the fact that therapeutic results eventuate when one adopts his position. But it has yet to be shown that the therapist's unconditional positive regard for the client and his ability to communicate within the client's frame of reference is in fact the only or the crucial therapeutic agent in client-centered therapy. (The same point could of course be made with equal cogency about psychoanalytic therapy. Here, too, we do not know whether interpretations or some other factor, or a combination of factors, produce the therapeutic results which are ascribed to the method.)

What research has shown so far is that certain patients suffering from more or less well defined problems when exposed to another person who is a benevolent listener (in the broadest sense) over an extended period of time become better able to express themselves, and that this process, which may or may not include so-called interpretations from the therapist, apparently leads to certain changes in the patient. These are experienced as greater subjective comfort and may be accompanied by greater mastery of personal problems or a diminution of symptoms. It is well known that other forms of experience (e.g., faith healing, confession, etc.) have produced similar results. It is also known that under the stated conditions a percentage of patients "improve" and a certain percentage fail to improve. Investigators (Frank et al, 1957) are now engaged in the painstaking process of exploring those patient variables which are correlated with improvement or its lack. We are as yet grossly ignorant of the factors in the therapist or the patient-therapist interaction which lead to one kind of change in one case and to another kind of change in another case. It should be stressed that insofar as psychotherapy aspires to the status of a science, there seems to be no alternative but to become increasingly explicit about the patient, the therapist, and their interaction. What has hampered research in psychotherapy more than anything else is the difficulty of demonstrating *invariance*, a synonym for meaningfulness in science (Rapoport, 1953, Ch. 2).

The phenomenological point of view, by its very emphasis on subjectivity of experience, appears to have serious limitations in this regard. Unless one is satisfied that a global psychological influence (the therapist's positive regard) leads to global changes in the patient (greater self-expression or "flow") there is no choice but to search

patiently for invariance amidst change. We must come to deal with such questions as: What kinds of patients are promising candidates for a particular kind of therapy and which ones are not? Is the therapeutic influence adequately defined by saying that the therapist shows unconditional positive regard, empathy, or fully accepts the client? Undoubtedly he does other things besides: he communicates his faith in the particular therapeutic approach; he singles out certain feelings for reflection but not others, thereby indicating that some feelings are important and some verbalizations are desirable whereas others are not, etc. As Frank (1958) has recently pointed out, it is the *nonspecific* elements in the various forms of psychotherapy which urgently demand our attention as researchers.

In contrast to Rogers' process scale which is focused on the large sweep of events in psychotherapy, Leary and Gill's[4] system is aimed at defining the dimensions, classifying the process events, and developing methods for measuring these dimensions. One might speak of Rogers' conception as macroscopic, Leary and Gill's as microscopic. Whereas Rogers' scale seems to imply a judgment of what is desirable or undesirable in psychotherapy, Leary and Gill's system, since it classifies events at a more atomistic level, seems to be largely free from this possible bias. Their system also takes account of the therapist's activity as well as the patient-therapist interaction. Rogers' scale is characterized by an elegance of simplicity, while the Leary and Gill system is a highly complex and intricate system of content analysis, unequaled in this respect by other available systems.

The system is based on the psychoanalytic model of personality structure and functioning but, according to its authors, is not restricted in its application to psychotherapy conducted within this framework. It yields ratings of personality variables (impulses, ideas, and their interconnections) as well as psychotherapeutic events (verbalization, patient-therapist interactions, and therapeutic interventions).

The system is stratified into three levels called expression, awareness, and unconscious. Each of these levels is subdivided into *impulses* and *ideation*, the basic elements in the system. Three variable systems are employed to classify impulses: *moods, interpersonal motives,* and *bodily impulses.*

In addition, the classification system comprises eight broad classes of personality or therapeutic processes called *Orders* which express the connection between impulses, ideas, and interpersonal events as well as the three levels.

The units of scoring are arbitrary time spans: 10 minute intervals, a session, etc. Scoring is done by technicians from typescripts, sound

[4] Leary, T., and Gill, M. "Dimensions and Measures of the Psychotherapeutic Process." The following comments are based on the version of the system presented at the research conference. It has since been revised.

recordings, or sound film. Every reference by patient or therapist for which there is a variable in the system is classified. A unique aspect is that scoring may also be done from summaries written by clinicians.

It is readily apparent that the coding procedure is an exceedingly complex and complicated task. Nevertheless, preliminary studies indicate rather high rater agreement.

When the scores are tallied a kind of psychogram emerges from which such observations as the following (based on a brief excerpt of therapy) may be gleaned:

> . . . this patient never mentions his relationship with the therapist . . . He focusses mainly on his emotional reactions to "Ann" and to girls in general. He has nothing to say about his unconscious motivation or his verbalized content and little to say about his ideation. He mentions two cause and effect relationships and four characteristics of his verbalization process . . . (we are dealing with) a unit in which the patient focusses almost exclusively on relationships with others and ignores the relationship with the therapeutic structure of his personality, defenses, and therapeutic processes.

The quantifications may be used for a number of comparisons, such as one patient's content about self vs. another patient's content; therapist's content about the patient at two points in time; one clinician's comment vs. another's, and so on.

The value of a system such as Leary and Gill's is difficult to assess. Once the question of rater agreement has been settled, a number of substantive research issues can be approached. This is the crucial test for any system of content analysis, which after all is but a methodological tool. Does the system aid in identifying meaningful relationships in therapy? Does it permit fruitful comparisons between patients, therapists, and patient-therapist pairs? How does Therapist A handle hostile impulses early in therapy as compared with Therapist B? What happens when such impulses are interpreted or not interpreted? In any system a few variables are conceptualized and dealt with and a much larger number is disregarded. Are the resulting measures helpful and heuristic? Another question is that of research economy. Does the yield justify the tremendous effort of quantification, or can comparable measures be obtained by much simpler methods? These issues cannot and should not be prejudged. They are to be answered by empirical research.

Any system of content analysis can be criticized both for what it omits and for the manner in which it conceptualizes what it includes. Such criticisms, however, should be held in abeyance until we gain

more information on the perennial question of validity-for-what? Leary and Gill's system reflects the dilemma between a desire, on the one hand, to strive for parsimony of classification and coding, and, on the other hand, to include "everything." As a result they find it necessary to invent additional *ad hoc* notations which augment the complexity of the system, thus making it more unwieldy than it otherwise might be.

Further, it appears that their variable system of bodily impulses, interpersonal impulses, and moods is open to question on several grounds. For example: "Look," "show," "manipulate," etc. are classed as sexual bodily impulses, as distinguished from aggressive bodily impulses and interpersonal impulses. As is well known, sexual and aggressive components are often exceedingly difficult to separate and in either event they have interpersonal implications. How can they be distinguished operationally? Another point concerns the atomistic character of the analysis which necessitates a somewhat artifical method of paraphrasing complex verbalizations to fit the system. Finally, Leary and Gill are faced with the formidable task of differentiating between verbal communications and their underlying motivational meanings. This difficulty is inherent in all attempts at analyzing therapeutic communications and basically remains unsolved: Either we restrict the analysis to verbal symbols, which promises a reasonably adequate rater consensus but omits the *sine qua non* of modern psychotherapy – the "depth" dimension; or, we search for the patient's motivational patterns behind the verbal façade, at which point we join the clinician who looks for broader contexts than the clause of a sentence. If we elect to pursue the second alternative, we also enter an area in which operational definitions are difficult to achieve, where inferences and speculations thrive, and where boundaries of meanings shift with the theoretical preconceptions of the observer. This is the matrix of psychotherapy which we seek to objectify; we must concede that so far it has proved remarkably elusive.

Leary and Gill do not conceive of their system as a panacea, and their proposal to compare their analyses with analyses based on other systems is a commendable one.

Systems such as that of Leary and Gill may go a long way toward objectifying the events of psychotherapy, reducing the semantic confusions which are still so prevalent among therapists when they attempt to describe the process of interaction, and bring closer to reality unbiased comparisons between patients, therapists, and therapeutic techniques.

In discussing the two papers at the conference, Dr. David Shakow raised a question about research strategy and asked: "Is not the important goal to collect data relevant to the problem no matter how complex and then use our talent for simplification in the *analysis* rather than in the original selection of the data?" He also warned that simpli-

fication may become a goal in itself which may entail the sacrifice of the core issues. For his part, he made a plea for more naturalistic data which should be studied repeatedly and according to different hypotheses. The present writer wishes to underscore Dr. Shakow's cogent observation that at the current stage of knowledge in this area, the widest variety of approaches is a desideratum of the first order. There is much to be learned from microscopic studies and from macroscopic ones; from experimental and naturalistic ones; from process studies and from outcome studies. The need for precise knowledge is great; the challenge to our imagination and ingenuity is exhilarating. The impression is inescapable that a good deal of promising work is being done, and that despite staggering difficulties we are slowly, if not surely, forging ahead.

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THE EFFECT OF LIGHT INTENSITY WHEN ONSET OR TERMINATION OF ILLUMINATION IS USED AS REINFORCING STIMULUS[1,2]

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Investigations into reinforcing properties of stimuli other than those directly related to hunger, thirst, and pain represent a comparatively rare endeavor though not a recent one (Barnes & Kish, 1957; Barnes & Kish, 1958; Butler, 1953; Girdner, 1953; Harlow, 1953; Kaplan, 1952; Keller, 1941; Kish, 1955; Marx, Henderson, & Roberts, 1955; Montgomery, 1954). Some of these studies utilize a situation which includes an intense light stimulus, the removal of which is found to be reinforcing (Kaplan, 1952; Keller, 1941). Keller (1941) and Kaplan (1952) further demonstrated that the reinforcing effects of light removal increase as a direct function of light intensity within rather wide limits. Conversely, the effect on some measured response of onset of a bright light would be expected to be negatively reinforcing (or depressive), and this effect should increase in a manner similar to that reported for intense auditory stimuli (Barnes & Kish, 1957).

At low intensities, however, light onset has recently been found to show *positively* reinforcing properties. For example, Girdner (1953), Marx et al (1955), and Kish (1955) have shown that the onset of dim illumination following a lever response in a Skinner box situation increases the rate of emission of that response, and it is further known that this rate increase is due to the contingency of illumination onset upon lever responding (Barnes & Kish, 1958; Kish, 1955).

These two lines of evidence indicate that the onset of light is positively reinforcing at low intensities but that at higher intensities it becomes progressively more and more negatively reinforcing. The present hypothesis is that both the positive and negative processes

[1] A part of this paper is based on a thesis submitted by the third author to the Faculty of Graduate Study, University of Maine. The first two authors, however, assume full responsibility for the present treatment of the data.

[2] The reported studies were supported in part by research grants from the Wilson Coe Research Fund, University of Maine.

[3] Now with West Virginia Pulp and Paper Co., Frostburg, Maryland.

operate simultaneously at all intensities, but in varying degrees. This hypothesis generates the following statements:

(a) Dim light onset produced by a lever response should result in a response rate increase, for at low illumination levels the lever response receives considerably more positive reinforcement than does releasing the lever. This effect should, however, begin to diminish beyond some point with light intensity increases.

(b) Conversely, if the lever response produces termination of a prevailing low intensity illumination, this response receives some reinforcement but releasing the lever receives more. Since, however, the release response is certainly a much larger response class than is the lever response itself, the reinforcing effects of light onset should be quite thinly spread over the components of the release response class. Hence, the most conservative prediction in this case would seem to be that lever response rate should at most not increase.

The present pair of experiments, then, were designed to investigate the effect of light intensity upon the reinforcing properties of onset and termination, respectively, of that light when the light intensities are not in the strongly aversive range.

EXPERIMENT I

Method

Subjects.

The Ss were 24 experimentally naive male mice of the homozygous dba/1 strain. All were approximately 120 days old at the beginning of experimentation. Ss were housed individually and given free access to food and water at all times in the home cages.

Apparatus.

Three identical sets of equipment were employed, each consisting of a 5¾" x 5¾" x 5⅞" Skinner-type box placed inside a larger, sound-insulated wooden box. From one of the flat black walls of the Skinner-type box an immovable U-shaped bar of ⅛ in. brazing brass protruded 5/16 in. Each box was ventilated, an electric blower providing both air flow and a continuous masking noise. A 7½ in. aperture, closed at both ends by plate glass and centrally located on the top of the insulated outer box, opened by means of a 5 in. high black cloth "light funnel" onto a diffusing medium in the removable plexiglass cover of the Skinner box. The light sources positioned above this aperture could, at the experimenters' option, be activated and deactivated by Hunter electronic contact relays placed across the metal floor of the Skinner box and the brass bar 1½ in. above the floor. Light from each source could thus be uniformly diffused into the appropriate box, giving selectable intensities of 0.18 or 4.10 millilamberts as measured by a Welch Densi-

chrometer at all points on the floor of each box. Each closure of the contact relays also operated Mercury counters at all times.

Procedure.

The Ss were divided at random into three groups of equal size. At approximately the same time each day, for 15 days, each S was tested in the apparatus for a 25 min. period. The experiment proper was divided into three successive five-day phases.

Phase I—Adaptation. On Days 1-5 all Ss were run in total darkness during each 25 min. period to habituate them to the test compartment and to determine their unconditioned levels of bar contacting.

Phase II—Conditioning. On each of the next five experimental days, Group C (Control) Ss continued to run under the conditions of Phase I, while Group DL (Dim Light) and Group BL (Bright Light) Ss received the onset of 0.18 mL and 4.10 mL of illumination, respectively. For these latter groups, illumination duration was subject-controlled, i.e., the light remained on as long as bar contact was maintained and terminated with termination of the contact.

Phase III—Extinction. On each of the final five experimental days each S was again run under the conditions of Phase I.

The Ss were rotated daily among the apparatus units to offset possible effects resulting from apparatus differences. After each 25 min. experimental period each subject compartment was cleaned and dried. The maximum temperature increase, under the experimental conditions within the subject compartments, was less than two degrees F. during a 25 min. period; this increase was found to be determined primarily by the presence of an S. Data consisted of total number of bar contacts for each S during each 25 min. experimental period.

Results

Mean total numbers of bar contacts for each group during each of the 15 experimental days are shown in Fig. 1. Inspection of Fig. 1 indicates that the groups are roughly comparable during both the adaptation and extinction phases. Analyses of variance performed over these two periods yielded F values of less than one in both cases. During the conditioning phase, however, the groups appear to be quite different, with the greatest number of responses emitted by Group DL, intermediate numbers emitted by Group BL, and the least numbers emitted by Group C.

In order to obtain a precise indication of the effects of the different light intensities during the conditioning phase, an analysis of variance was performed over the differences between the five-day mean total numbers of responses for each group during conditioning and the five-

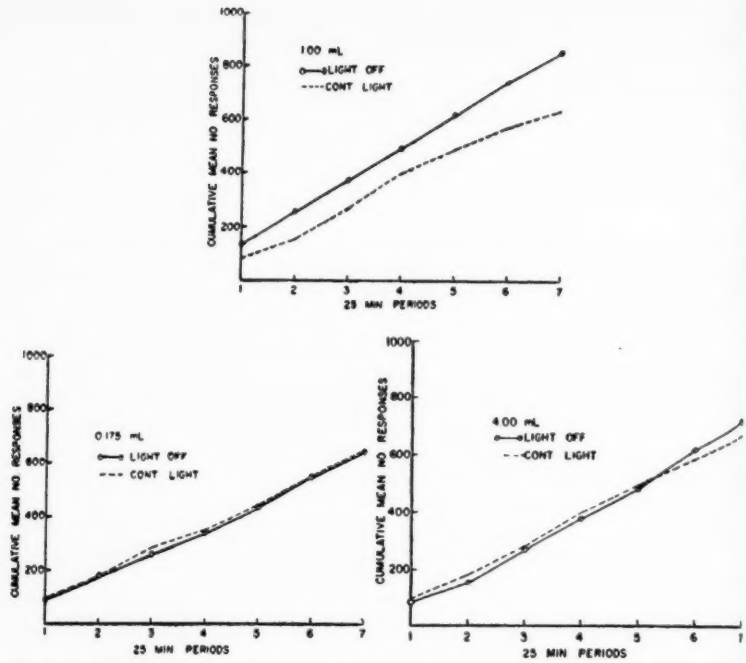

Fig. 1. Mean total numbers of responses for the three groups plotted as a function of successive experimental days.

day mean totals during adaptation. This analysis indicated that the three groups were significantly different in this respect ($F=4.07$, $P<.05$).

Discussion

The results of Experiment I support the hypothesis that the overall positively reinforcing effects of dim light onset change with increases in the intensity of that light, thus verifying our first prediction above. The data obtained during the conditioning phase indicate that this relationship is curvilinear, beginning at zero, increasing to a maximum, then falling toward the negative range with increasing light intensity.

These data, however, are not completely consistent with earlier findings in that they indicate an almost immediate return by the two experimental groups to the response level of the control group during the extinction phase rather than the gradual return noted by Kish (1955). It should be noted that different strains of mice were used in the two investigations. Further experimentation may determine if strain differences and/or other factors were responsible for the differences in the obtained results.

EXPERIMENT II

Subjects.

Thirty-six experimentally naive homozygous dba/1 male mice were tested in this study. Ss were marked and housed two to a cage, and allowed free access to food and water at all times in the home cages.

Apparatus.

The equipment described in Experiment I was again employed in the second study. The illumination levels here used were 0.18, 1.00, and 4.10 millilamberts, chosen because the results of Experiment 1 clearly indicated that onset of either of the two extreme intensities clearly functions as a reinforcer for bar contacting.

Procedure.

Ss were randomly assigned to the six groups of the 2 x 3 factorial design defined by the three light intensities and two consequents of bar contact. During each 25 min. experimental period on each of seven consecutive days, Ss in the three "Light Off" groups received for each bar contact the subject-controlled termination of the light which suffused the Skinner-type box. The Ss in the three "Continuous Light" groups received no change in the prevailing illumination level as a consequence of bar touching.

Records were kept for each S of total number of bar contacts made during each 25 min. experimental period. Ss were run in blocks of three and rotated daily among the three apparatus units.

Results

Cumulative mean total numbers of bar contacts made during each 25 min. experimental period are shown in Fig. 2. The remarkable similiarity of the six groups throughout the experiment is marred only by an apparent deviation in the 1.00 mL "Light Off" group. Statistical analyses indicate, however, that this single deviation is much more apparent than real. First, analysis of variance of total numbers of bar contacts made over the seven experimental days yielded F values of less than one for both major variables and for interaction. Further, inspection of the cumulative curves suggests that these functions may be linear and that their slopes are quite similar. Accordingly, straight lines were fitted by the method of least squares to each cumulative curve, and the F tests performed indicate no significant departures from linearity. Analysis of variance of the slopes of the fitted straight lines also yielded F values of less than one for each major variable and for interaction, indicating that all six groups were responding at approximately the same overall rate.

Discussion

On the basis of the data here reported, one can only conclude that within the studied range the overall effect on behavior of response-

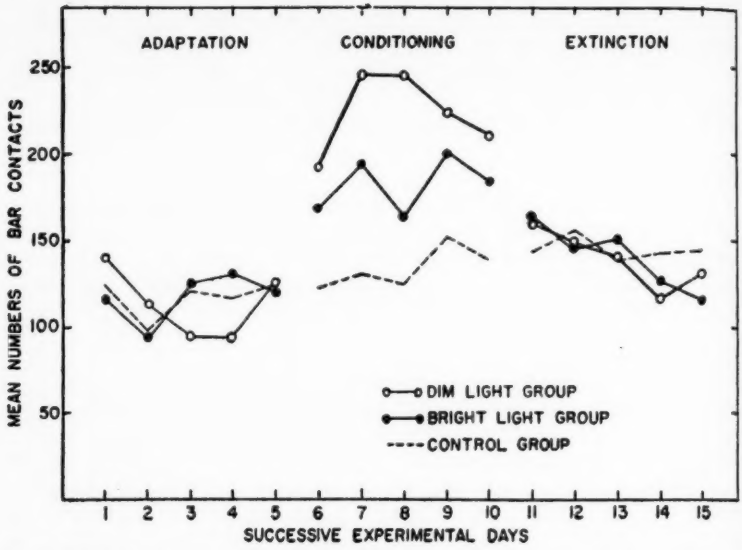

Fig. 2. Cumulative mean numbers of bar contacts made by the six groups over the seven experimental days.

contingent light termination is no different than no illumination change at all. This conclusion is made particularly compelling by the slope analysis, for if probability of bar contact had been significantly altered by light termination then the "Light Off" groups would have been responding at a significantly different rate than were the "Continuous Light" groups. But this was not the case, and our second prediction above is therefore at least not refuted by these data.

Several theoretical implications of the data obtained in the two present experiments seem worthy of note. First, no support is given to the contiguity assumption (Guthrie, 1952) that any environmental change is a reinforcer, for although Experiment I demonstrated a reinforcing effect in the case of illumination onset, no such effect was found for light termination in Experiment II. Second, the many and influential learning theories (e.g., Dollard & Miller, 1950; Hull, 1952; Spence, 1956) built around primary drives and their reduction as ultimately critical factors in learning seem inadequate in dealing with the data here reported, since the illumination levels used were not experimentally established as secondary reinforcers. Appeals to the feeding history of the mice in the home cages as leading to the establishment of light as secondary reinforcer seem incorrect, for the same feeding history should establish similar properties for darkness. In fact, the well-documented nocturnal habits of the mouse might lead one to make the opposite prediction. Third, the light onset phenomenon shown in studies such

as the present Experiment I is sometimes explained in such terms as stimulus novelty and/or exploratory drive (e.g., Glanzer, 1958; Harlow, 1953; Montgomery, 1954). Such explanations are apparently incomplete in light of the negative result of Experiment II, for it would seem *a priori* that termination of a light following bar contact should be novel or exploratory-drive-arousing just as is onset of a light; yet such clearly was not the case.

In a recent article, Glanzer (1958) summarized the now rather extensive research in an area in which the studies appear to have at least one common feature. In general such experiments demonstrate, as did the present Experiment I, response strength increments resulting from the presentation of stimuli (e.g. Dashiell mazes, mechanical puzzles, brief exposure to the laboratory environment) apparently unrelated to organic drive states, thus qualifying such stimuli as reinforcers. On the basis of these data and the information contained in the two experiments here reported, the present authors believe that a common psychological phenomenon is involved for which we propose the term "sensory reinforcement" (i.e., the response-contingent occurrence of stimuli unrelated to the usual organic need states). This integrating concept is at present under extensive examination in our laboratory.

SUMMARY

Two experiments were performed to examine the reinforcing effects of onset and termination of non-aversive illumination, made conterminous with lever contacting, as a function of illumination level. Within the 0.18-4.10 millilambert range studied, reinforcing properties of light onset were found to yield a concave-downward function while light termination was not found to alter response rate. Implications of the results for several current theories were discussed and a possible integrating concept, termed "sensory reinforcement" was proposed.

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RESPONSE TO HORIZONTALITY BY BANTAM CHICKENS IN LEVEL AND TILTED ROOM[1]

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In order to behave adaptively within the spatial world, it is necessary to perceive and respond to the horizontal and vertical coordinates. The sensory cues for this process may come either through vision, that is, from the horizontal and vertical lines in the visual field; or through proprioception, that is, from the pull of gravity on the body affecting kinaesthetic and vestibular receptors. Visual and proprioceptive cues are normally in agreement about the spatial coordinates. However the following question has been raised by Koffka, Gibson, Witkin, and others (reviewed by Gibson, 1952): Which cues are decisive when a conflict situation is arranged experimentally by tilting the visual framework relative to gravity? The perceived vertical may be measured in such a situation by having the person either adjust a visual line to the vertical or adjust his own body to an upright position. Some experiments have shown a strong influence of the visual framework with large individual differences while others have shown a consistent predominance of proprioceptive cues. Among the possible explanations for these contradictory results are the following: different instructions were given to the subjects, varying interpretations of the word vertical were made, and the response in some cases was influenced by rational judgment and awareness of the situation. One obvious solution for such difficulties is to use less-talented subjects. Chickens were felt to be sufficiently less talented for this purpose.

Sensory processes may be tested in animals either by discrimination training or by the stimulus preference method. The former has recently been used by Ordy (1958) to study verticality perception. Operant conditioning was employed to train pigeons to adjust a luminous line to the vertical in a dark test box. When a background frame was added, there was consistent deviation of unknown magnitude in the direction of the tilted visual framework.

The stimulus preference method offers advantages over discrimination training for some problems (e.g. Fantz (1958). The purpose of the present study was to find whether this method is applicable to the

[1] Presented at the meeting of the American Psychological Association in Washington, D. C., September, 1958. The research was supported in part by grant B-1041 from the National Institute of Neurological Diseases and Blindness, U. S. Public Health Service, and by a grant from the Cleveland Foundation.

problem of perception of the spatial coordinates in animals. The aim was to use a visual response measure which would be somewhat comparable to having a person adjust the orientation of a visual stimulus.

METHOD

Apparatus

The testing method was based on the natural tendency of birds to land on a level surface in preference to a sloping one. This response presupposes the visual discrimination of degree of tilt since the selection of a landing place is made from a distance. A circular landing edge was utilized to present the choice of the level top point or of any degree of slope in either direction.

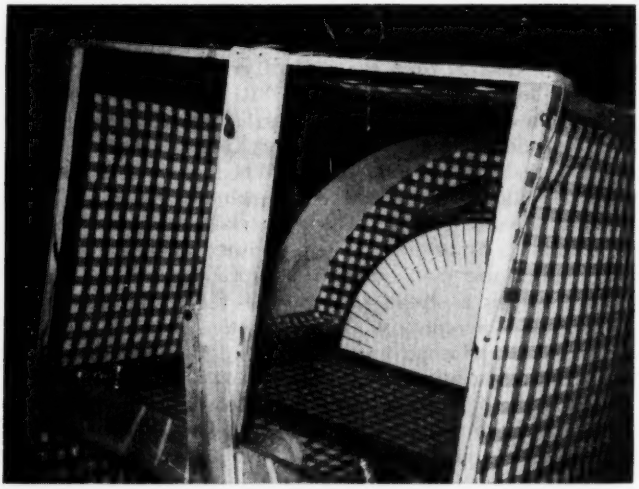

Fig. 1. The miniature testing room in the 15° right tilt position. The spherical starting perch is at bottom foreground. A subject is on the landing disc at the other end. Food cups are out of sight behind the disc. The white cardboard above the disc served to equalize the landing space around the disc.

The apparatus is shown in Figure 1. The landing disc measured 44 in. across. A ball placed 42 in. from the disc provided a level starting perch for any orientation of the room. The ball and disc were attached to the floor of a miniature room with an accentuated visual framework. The room could be tilted and secured in five orientations—level, 15° right or left tilt, and 30° right or left tilt.

Observations were made through one-way vision curtains covering the front end of the room. Since the disc was marked off in degrees, the landing position of the bird (the point midway between the feet) was easily noted.

Subjects and Procedure

The subjects were 14 Golden Seabright bantam hens. They were

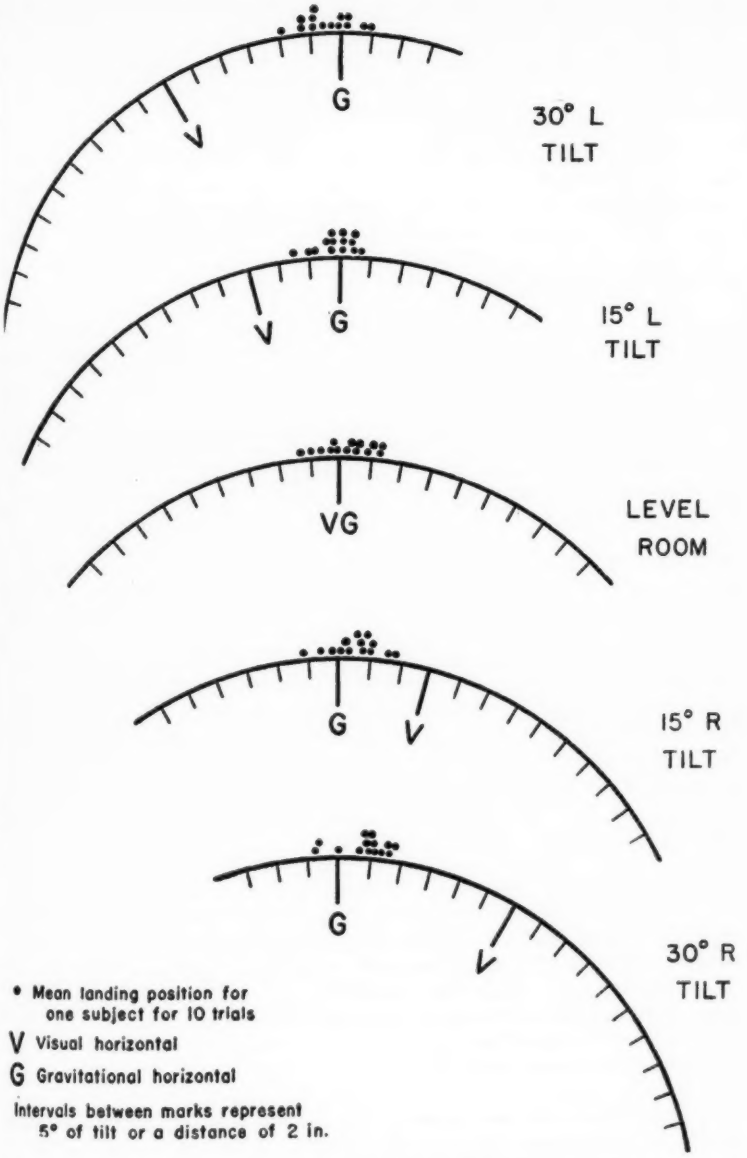

Fig. 2. Distribution of landing positions for each orientation of the miniature room. Responses are plotted along an arc of the landing disc, showing their deviation both relative to the true level position and relative to the point which was level according to the visual framework.

initially trained to fly from the ball to the disc to obtain mash from one of the food cups distributed around the back edge of the disc. The room orientation was varied randomly and all responses were rewarded. Thus there was no differential reinforcement relative to either landing position or room orientation.

The test was started by placing a bird on the starting perch in the dark, allowing a few seconds for adjustment to an upright posture, and illuminating the room. After the animal flew to the disc, it was allowed to eat while the response was recorded. Then, after the room was darkened and changed in orientation, the bird was returned to the starting perch for the next trial.

The subjects were given 10 trials each day, including two with each orientation of the room, in random sequence. They were tested on five consecutive days.

RESULTS

Figure 2 gives the distribution of landing positions for each room orientation, relative to both the visual horizontal position (V), and the gravitational horizontal position (G). The two reference points coincide only with level room.

The landing positions for the level room condition cluster around the correct position with an overall constant error of only 1.2° to the right, indicating an accurate perception of horizontality.

For each tilted-room condition, the landing positions cluster around the gravitational horizontal rather than the visual horizontal. Of 56 average landing positions, only two were closer to V than to G. Thus the visual framework did not have a decisive effect on the perception of the horizontal in a conflict situation; proprioceptive cues were clearly dominant. Although a majority of the subjects showed a deviation towards V, the overall constant error was small—3.1° for 30° room tilt and 1.8° for 15° room tilt.

A control test was made to determine whether this small error was due to the tilted visual framework or to some uncontrolled covarying factor. For instance a slight tendency to veer toward the middle of the test room (and thus toward V) would produce an error such as that obtained. To check this possibility, the tilted framework of the room was largely obscured while the crosslined cloth covering was attached to and lined up with the level outer room rather than with the miniature room (Fig. 3).

The control test was given to five subjects. The landing positions of these subjects for the control test and main test were compared. No consistent difference was shown. The average error was approximately the same in the control test, with a primarily untilted visual framework; and in the main test, with a completely tilted and accentu-

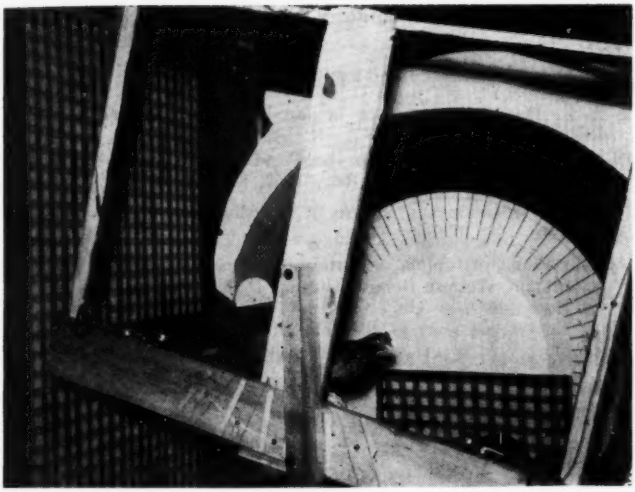

Fig. 3. The testing room as changed for the control test, with tilted lines largely eliminated. A bird is on the starting perch.

ated visual framework. Thus the small deviation from the gravitational horizontal in Figure 2 cannot be attributed to the influence of visual cues of tilt.

CONCLUSIONS

The conclusion is that the spatial orientation of a visual stimulus was perceived through the aid of proprioceptive cues, and that this perceived horizontal was affected little if any by a tilted environment. Further research is needed with various species, at various stages of development, and using various testing procedures before attempting to generalize the results or relate them to theory.

A more important conclusion is methodological. The stimulus preference method was demonstrated to be adaptible to the study of a complex type of discrimination process as an alternative to discrimination training. The use of a diversity of methods for a given problem is desirable in itself; in addition, there are advantages relating to the nature of this method. First, by taking advantage of naturally-occurring discriminatory responses, research is less time-consuming. Second, direct observation and recording of the animals' behavior, "with the aid of apparatus no more complex than the human eye and brain" (Harlow, 1957, p. 490), provides a better chance of avoiding artifacts and gaining new hypotheses, at far less expense than with automatic apparatus. A third advantage is that experience and learning are more easily controlled for the study of development when complex training procedures are not required for testing. Finally, it is likely that results based on natural adaptive behavior bear some relation to what

happens outside of the laboratory and outside of an experimenter's control.

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BEHAVIOR OF RATS FOLLOWING A STRESS SITUATION

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A previous study (Barthol & Ku, 1959) showed that human Ss under stress regress to the earlier learned of two behaviors. The present study was designed to test the hypothesis that rats under stress will regress to the *earliest* learned behavior appropriate to the situation.

METHOD

Subjects

The Ss were 15 male albino rats, 3 to 5 mo. in age, obtained from the vivarium stock at the University of California.

Apparatus

The apparatus consisted of three identical modified Skinner boxes which allowed three animals to be trained at any one time.

A box had six sides; two of them were 15 in. by 18 in. The front of the box consisted of three panels 9 in. by 8 in. Each front panel was equipped with a metal food cup 2½ in. from the left side of the panel and 1½ in. from the floor. It was possible to attach either a bar, a rope, or a panel to any of these three walls. The bar was made of ¾ in. by 4 in. lucite painted red. It was centered in the wall 3½ in. above the floor. The rope assembly consisted of a 2¾ in. rod of plastic which was fastened to the top of a front panel, from which was hung a 6 in. light-weight chain on the end of which was a ½ in. diameter pull. The panel was a 4 in. by 7 in. sheet of lucite painted red, hung from the top of the box. When the bottom of the panel was pushed toward the wall, a micro-switch which controlled the food release mechanism was triggered.

The back wall of the box was a hinged 11 in. by 8 in. panel through which animals were introduced into the box. The top of the box was covered with hardware cloth. The box could be divided into three sections with glass panels.

Procedure

The animals were placed on a 6 gm. per day feeding schedule to establish a hunger cycle 5 days prior to the start of training. Each animal learned all three tasks, the training sessions being separated by 48 hour intervals. Since the animals could obtain as much food as they wanted

during training, they were given only 1½ gm. of food 24 hr. following each training period, so that a similar level of deprivation could be established for each training session. The test session allowed an animal one pellet of food after which he was given 6 gm.

A naive animal was introduced to the box with all three tasks, i.e., the bar, rope, and panel, available but not functioning. He was allowed to explore it for 15 min. and then was removed. He was then replaced in the box with only one task available and the glass partitions in place. He remained there for eight hours during which time he learned to perform the task and get the food. Forty-eight hours after removal from the box he was again placed in it, this time with a different task and in a different position. Again he was trained for eight hours. This was repeated a third time with the final task and position. The order of tasks, and positions of the tasks, were counterbalanced over the animals.

Three animals were trained at the same time in three boxes. One set of animals started at 6 A.M., a second set at 2 P.M., and a third set at 10 P.M. Thus nine animals were trained in 24 hours.

Forty-eight hours after training on the three tasks, Ss were placed into cages which were lowered 1½ in. into ice water. Air from a vacuum cleaner was directed at them; they were shaken in the cages and then dropped. Each animal was then placed in the Skinner box with all three tasks available and in the position they were in during training. The animal was allowed to make one response and to eat the pellet. He was then removed. Twenty-four hours later he was again placed in the box and allowed to respond. This time no stress conditions preceded the entry into the box.

RESULTS AND DISCUSSION

An analysis of the data obtained on the first test, the stress test, yielded non-significant results. The binomial test (Siegel, 1956) was used to test the hypothesis that animals would regress to first learned behavior. Data were also analyzed to determine if the animals regressed to the earlier (i.e., either first or second) learned behavior. Neither analysis yielded significant results. It should be noted that the animals did not select the last learned task better than at a chance level.

The hypothesis to be tested in this study did not require that the tasks be equated. Difficulty level should produce no differences in regression. However when the data were examined to see which tasks were performed on the test trial, it was found that the bar was pressed by eight animals, the rope pulled by six, and the panel depressed by one. The chi square equaled 5.2 for these data, which fell between probabilities of .10 and .05. The second test, the non-stress test, showed the same order of preference (ten animals pressed the bar, three pulled the rope, and two depressed the panel). This chi square equaled 7.6 which was between the probabilities of .05 and .02.

The animals did not have more training on the bar. The mean amounts of food consumed on the three tasks for all animals were: bar–19.45 gm.; rope–20.30 gm.; panel–20.59 gm. These were not significantly different.

Although it was conceivable that the order of tasks during pretraining may have influenced the preference for the bar, the data clearly indicated that the bar was preferred over the rope and the rope over the panel.

The non-significant results obtained in this study might be attributed to the strong order preference of the tasks. The hypothesis should be investigated with tasks equated for difficulty. More cogent reasons for the obtained results might be that the animals recovered too quickly from stress or that the stress was not traumatic enough. An anthropomorphist's view of the rats was that they were quite unruffled by the time they were placed in the test box although they displayed signs of great agitation in the stress situation seconds before.

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SOCIAL INFLUENCE: SELF-CONFIDENCE AND PRESTIGE DETERMINANTS[1]

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In recent years considerable experimental interest has developed in the effect of social influence variables on judgments (attitudes, opinions, etc.). Essentially the basic datum is the effect of judgments from an influence source upon subsequent judgments of S.

Distance (the discrepancy between S's pre-influence judgment and the judgment originating from the influence source) is a significant determinant of both movement and conformity (Asch, 1956; Fisher & Lubin, 1958; Fisher, Rubinstein, & Freeman, 1956; Hovland & Pritzker, 1957; Zolman, Wolf, & Fisher, 1959).[3] It has been found generally that movement toward the influence source increases with the distance to which S is exposed (Fisher & Lubin, 1958; Hovland & Pritzker, 1957; Zolman et al, 1959). Conformity is a decreasing monotonic function of distance (Fisher & Lubin, 1958; Zolman et al, 1959). These measures have been studied both in single and in continuous interaction situations (Fisher & Lubin, 1958; Fisher et al, 1956; Zolman et al, 1959).

Throughout various reports there is the impression that personality factors are of some import. Investigators have sought a relationship between social influence (suggestibility) and other personality variables (Bernberg, 1954; Crutchfield, 1955; Fisher, Williams, & Lubin, 1957; Hoffman, 1953; Krebs, 1958). Some studies have been concerned only with the effects of various situational variables and have tended to minimize any personality determinant (Goldberg, 1954; Kidd, 1958; Wiener, Carpenter, & Carpenter, 1957; Zolman et al, 1959).

A third approach, represented in the present report, sought to manipulate experimentally certain personality–like variables within the social influence situation. This has involved enhancing a partner's "prestige" by introducing a confederate as an expert (Mausner, 1953), varying the "prestige" of the confederate through his failures and successes in preceding judgments (Mausner, 1954), or having *E* evaluate

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[3] A distinction is made between movement and conformity. Movement refers to the amount of change from S's initial judgment while conformity is movement relative to distance.

certain judgments as right or wrong (Kelman, 1950; Luchins & Luchins, 1955). Manipulation of the prestige variable also may be considered to affect S's confidence in his own judgments.

PROBLEM

The present study sought experimentally to manipulate certain personality-like variables in a continuous social interaction situation rather than depend upon personality pre-tests, with all the attendant problems of relevance of factor measured, validity, reliability, etc.

In the continuous interaction situation the effects of influence are measured successively to different stimuli. Validation for S of either his own judgment or the judgment from the influence source can be accomplished after one influence attempt and before another. The effect on the latter may be studied as a function of the validation experience. This could consist of some operation allowing S to count the number of units in the stimulus to which he previously rendered a judgment. By confirming S's judgment (self-confidence group) an attempt is made to increase self-confidence and/or decrease the partner's prestige; by confirming the judgment from the influence source (partner-prestige group) an attempt is made to increase the partner's prestige and/or decrease self-confidence; a count midway between S's judgment and the influence source would provide a control situation.

The following experimental hypotheses were tested:

Movement: 1. Movement in the direction of the influence source in the second interaction is greater for the partner-prestige group than for the self-confidence group. 2. Movement in the direction of the influence source in the second interaction is greater for the partner-prestige group than for the control group. 3. Movement in the direction of the influence source in the second interaction is less for the self-confidence group than for the control group.

Initial Estimates: 1. The initial estimates to the stimulus in the second interaction (B_1) of Ss in the partner-prestige group are higher than those in the self-confidence group. 2. The initial estimates to the stimulus in the second interaction (B_1) of Ss in the partner-prestige group are higher than those in the control group. 3. The initial estimates to the stimulus in the second interaction (B_1) of Ss in the self-confidence group are less than those in the control group.

METHOD

Pairs of Ss (same sex) were placed in a social influence situation requiring judgments of the number of paratroopers seen in briefly exposed photographs. The basic procedure of Fisher and Lubin (1958) was employed with minor modifications.

Subjects

One hundred and thirty-five volunteers from elementary psychology classes served as Ss. Because of errors in procedure, reported pre-

vious knowledge of the experiment, or unbalanced cells in the experimental plan data from nine Ss were discarded.

Warm-up Phase

Judgments were required to four successive photographs. When the Ss agreed or had rendered three estimates to a single picture they were permitted to make a count. During this phase Ss became acquainted with the general procedure, particularly that of exchanging written estimates through one of the two Es.

Photo A

Two photos (A and B) were used in the experiment proper. After an initial written estimate (A_1) S was asked to write the extent to which he believed his judgment and that of his partner might deviate from the true number (SQ_A & PQ_A respectively). He was told that direction could be indicated as above (+), as below (−), or as both (±). Each S was then exposed to a distance of 160. This was controlled by intercepting each S's initial judgment and substituting a bogus message (160 greater than his own and supposedly from his partner) in the exchange. Four additional estimates (A_2 to A_5) and message exchanges completed this phase.

Experimental Groups

On the basis of the size of initial estimates to Photo A Ss were classified into seven sub-groups (50-84, 85-119, etc.) From these subgroups Ss were then assigned to the control, confidence, and prestige experimental conditions in predetermined counterbalanced orders (CPS, PSC, etc.). This was to control for any possible relationship between the first judgment to Photo A and the initial estimate and movement in the second interaction.

Validation Operation

Each S was presented a card with dots *supposedly* representing the number of paratroopers in the A picture and was instructed to make a count if he wished. The distribution of dots approximated that of the paratroopers in the first experimental photograph (165 paratroopers). Each card was divided into four parts with the count printed in each quadrant and the total indicated at the top. A total of 16 such cards was available in the series from 51 to 426 (interals of 25). A self-confidence S received a card where the total approximated his initial estimate (A_1); a S in the partner-prestige group found the number approximating the bogus estimate (i.e., 160 greater than his own); the card for a control S was midway between the self and bogus estimate (i.e., 80 greater than his first judgment). Since the cards were prepared with intervals of 25 a maximum error of 12 was possible.

Photo B

After the validation operation the second interaction was initiated by exposing Photo B (approximately 300 paratroopers). Each S made

an initial judgment (B_1) and then SQ_B and PQ_B estimates. Each message which was then received, *supposedly* from the partner, represented a distance of 320 and was followed by a final judgment (B_2).

The Ss were then allowed to converse with each other and the *Es* regarding the nature of the study. This provided opportunity to determine prior knowledge of the experiment and to emphasize the necessity of secrecy for maintaining naiveté of future Ss.

RESULTS

The principal dependent variables in this study were the initial estimate (B_1) and movement ($M_B = B_2 - B_1$) for the second photograph. The initial estimate was S's judgment when first presented with Photo B after completing the procedure for Photo A (same for all Ss), and one of the three validation experiences (the independent variables). Corresponding values for Photo A represented S's performance before the introduction of the experimental variables. Since S rendered five successive judgments after exposure to Photo A four movement measures were possible. Only the differences between the initial estimate and the second judgment ($M_{A_1} = A_2 - A_1$) and the last ($M_{A_4} = A_5 - A_1$) are presented.

In another influence study using the same materials and with Ss from the same college no sex differences were found (Zolman et al, 1959). In the present design the sex variable was ignored (except that pairs were of the same sex) and Ss were assigned to the experimental groups on the basis of initial estimates alone. An equal distribution of males and females in each of the groups did not result. Because of the small number of males in the group the sexes could not be compared. Sufficient female Ss made a study of them alone possible. To equalize *ns* and to match initial estimates in the three experimental groups Ss were eliminated randomly.

Table 1 presents a summary of the findings for all Ss. Because of the skewed distributions the median has been used in all cases. Friedman's two-way analysis of variance by ranks was utilized to determine the statistical significance of differences (Siegel, 1956). No statistically significant differences were found between the groups for the initial estimate or the two movement measures (M_{A_1} and M_{A_4}) for the first interaction. Since all Ss received the same treatment in the Photo A phase the results were consistent with the assumption that the groups had been equated by the initial estimate matching procedure.

Following the validation operation the groups differed both on initial estimates and movement for Photo B. In each case the differences were statistically significant and in the direction anticipated by the experimental hypotheses.

TABLE 1

MEDIAN INITIAL ESTIMATES (A_1, B_1) AND MOVEMENT SCORES (M_{A_1}, M_{A_4}, M_{B_1}) WITH Xr^2 VALUES BETWEEN GROUPS.

GROUP	N			PHOTO A			PHOTO B					
	M	F	T	A_1	M_{A_1}	M_{A_4}	B_1	*df*	Xr^2	M_{B_1}	*df*	Xr^2
Self-Confidence...	13	29	42	110	50	75.0	250			30.0		
Control.....	19	23	42	105	49	75.0	300			74.5		
Partner-Prestige...	7	35	42	100	50	62.5	315			150.0		
SC vs. C vs. PP								2	12.05**		2	32.26**
SC vs. C.....								1	5.90*		1	15.72**
SC vs. PP.....								1	9.96**		1	23.21**
C vs. PP.....								1	3.89*		1	8.42**

*$p < .05$ **$p < .01$

Table 2 presents a summary of the findings for females alone. Again there were no statistically significant differences between the groups for Photo A results, suggesting the adequacy of the assumption that the groups had been equated by the initial estimate matching procedure. Following the validation operation the groups differed both on initial estimates and movement. In each instance the overall Xr^2 (SC vs. C vs. PP) was statistically significant. Individual comparisons of the groups showed statistically significant differences for three of the six Xr^2's computed. Inasmuch as all differences for the total population used were statistically significant and since all results were in the hypothesized directions, the failure to obtain significance in the three cases was interpreted to be a function of the reduced *n* in the sub-groups of females. Furthermore, it should be pointed out that Friedman's two-way analysis of variance by ranks is a two-tailed test.

TABLE 2

MEDIAN INITIAL ESTIMATES (A_1, B_1) AND MOVEMENT SCORES (M_{A_1}, M_{A_4}, M_{B_1}) WITH Xr^2 VALUES BETWEEN GROUPS FOR FEMALES.

GROUP	N	PHOTO A			PHOTO B					
		A_1	M_{A_1}	M_{A_4}	B_1	*df*	Xr^2	M_{B_1}	*df*	Xr^2
Self-Confidence...	23	100	50	80	225			30		
Control.....	23	95	55	80	280			75		
Partner-Prestige...	23	100	55	65	300			150		
SC vs. C vs. PP.						2	10.96**		2	8.85*
SC vs. C.....						1	2.89		1	3.62
SC vs. PP.....						1	12.68**		1	8.63*
C vs. PP.....						1	3.62		1	4.43*

*$p < .05$ **$p < .01$

As an additional check upon the impact of the validation operation a measure was obtained of the alterations in the relationship between self-confidence and prestige of the partner. The *Ss* were required to estimate the extent of confidence they had in their own and their

partner's estimates in each of the two interactions. The predicted range of error for the partner was subtracted from that for S.

TABLE 3

MEDIAN Q DIFFERENCES ON FIRST AND SECOND INTERACTIONS WITH Xr^2 VALUES BETWEEN GROUPS.

GROUP	N			PHOTO A	PHOTO B		
	M	F	T	$Q_{A^S}-Q_{AP}$	$Q_{B^S}-Q_{BP}$	*df*	Xr^2
Self-Confidence	13	27	40	0.0	−17.5		
Control	18	22	40	0.0	0.0		
Partner-Prestige	37	3	40	5.5	+30.0		
SC vs. C vs. PP						2	30.70**
SC vs. C						1	.63
SC vs. PP						1	19.60**
C vs. PP						1	24.03**

*$p<.05$ **$p<.01$

A plus value, therefore, indicated the expectation of greater error for the S than for his partner and vice versa. Because two Ss did not give complete data on the Q measures they were dropped from the analysis along with other Ss randomly eliminated to equalize the *N*. These difference values are presented in Table 3. Again, consistent with the assumption that the groups had been matched, no statistically significant differences between them were found for the first interaction. For Photo B the overall analysis led to a rejection of the null hypothesis that the groups were the same in relative estimates of self and partner judgment accuracy. Two of the three group comparisons showed statistically significant differences. The Q findings were consistent with the expectation that the validation operation would provide for estimates of relatively greater accuracy for partner in the partner-prestige group and for self in the self-confidence group, etc.

DISCUSSION

The results demonstrated the efficacy of interpolating an objective validation operation between judgments to successively presented stimuli in the social influence experiment.

Previous investigations involving successive judgments have demonstrated a serial effect upon initial estimates in the second interaction ("inter-trial effect"). Movement in the second interaction was a function of distance within that interaction rather than the distances to which Ss were exposed during the preceding stimulus situation (Fisher & Lubin, 1958; Zolman et al, 1959). The validation operation affects initial judgments *and* movement in the second interaction. In this study a distance of 160 was used for all Ss in the first interaction and 320 in the second. How validation affects movement and initial estimates when other distances are utilized in each stimulus situation or

the nature of the interaction between these variables requires further research. (In a sense distance itself may be considered a situational variable affecting confidence. Is S's movement following an influence attempt a function of the effect upon confidence in his own first judgment?)

In previous studies (Fisher & Lubin, 1958; Zolman et al, 1959) which utilized essentially the same technique (except the validation operation) higher initial estimates to Photo B were obtained for the 160 distance groups. This suggested a possible depressing effect of the validation variable but comparisons between the studies were difficult because some conditions were not equivalent (population, and the sex of one of the experimenters).

The Q values are crude attempts to measure variation in the confidence each S had in his own versus his partner's estimates. The Ss in the three groups had the same relative confidence in self and partner judgments in the first interaction. Following validation, however, the self-confidence group had relatively *less* confidence in partner (or more confidence in self) while the partner-prestige group had relatively *greater* confidence in the partner. These labels for the experimental groups were for convenience in identification and do not imply a conclusion as to the kind of effect from validation. The results do not indicate whether validation affects self-confidence or prestige or both.

The validation technique provides certain advantages over other attempts to manipulate prestige. Presenting a partner (confederate) as an expert (Mausner, 1953) or supporting the self or partner judgment by "right" or "wrong" evaluations from *E* (Kelman, 1950; Luchins & Luchins, 1955) involve problems of rapport, intonation, etc. With the introduction of a confederate as an expert there is no validation of self or partner estimates by objective comparison with the stimulus or a representation of the stimulus. Varying the prestige of the confederate by successes or failures in similar tasks (Mausner, 1954) is an attempt to eliminate problems associated with the verbal instruction techniques. Utilizing dot counting on prepared cards in the present study provided a more direct confirmation of S's performance or that of the partner. This appears to maximize careful control and to provide a basis for manipulating the variable along a continuum in a more easily quantified manner. The value of this procedure was further emphasized by S's apparent naiveté. Even when informed of the falsification in the bogus message exchange to control distance they indicated no sophistication regarding the deception involved in the validation.

SUMMARY

In a continuous social influence situation S's were required to estimate the number of paratroopers in two briefly exposed photographs both before and after judgments were rendered by a partner. A valida-

tion operation for each S was interpolated between the judgments to the two photographs and was intended to affect his self-confidence and/or the prestige of his partner before the second set of judgments. This procedure consisted of counting dots on a prepared card *supposedly* representing the number of chutes in the first photograph. For the self-confidence group the number of dots approximated the S's own judgment for the first photograph. Those in the partner-prestige group had the partner judgment (distance of 160 greater than that of S) confirmed similarly. A control group counted dots of a number midway between the two judgments. (n of 42 in each group).

In an influence attempt following validation, statistically significant differences between the groups were found for initial estimates, movement, and relative confidence in the accuracy of self and partner estimating. The results were in the predicted directions with the partner-prestige group showing the larger initial estimates, greater movement, and relatively greater confidence in partner estimating (less in self). The significance of the method and suggestions for further research were discussed.

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